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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,064	03/16/2004	David R. Sar	PD-03W120	3773

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EXAMINER	
PETTITT, JOHN F	

ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/802,064	SAR ET AL.	
	Examiner	Art Unit	
	John Pettitt	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *30-36* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 11, 13-19, 21-25 and 28* is/are rejected.

7)☒ Claim(s) *7-10,12,20,26,27 and 29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *16 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 1-29 in the reply filed on 08/21/2006 is acknowledged.

Specification

The disclosure is objected to because of the following informalities: The description, "*...the chamber may be evacuated to a medium-level vacuum (e.g., around 10^{-2} Torr) with a less expensive roughing pump, and the filling and the purging may be repeated to reduce impurities from the chamber to obtain a high concentration of the substantially-pure gas*" (page 2, lines 9-12), leads to confusion as to what is being repeated. A previous description of how the chamber is being purged states that, "*Impurities, such as air, may be purged from the chamber by filling the chamber with the gas.*"(page 1 line 33 - page 2, line 1) This means that the step being performed is the step of filling the chamber with the gas. Therefore, this would lead to the improper interpretation of the statement on page 2, lines 9-12, that the repeated steps are, 'the filling and the filling'. The examiner respectfully suggests replacing the above underlined statement with **--the filling and the evacuating--** or **--the purging and the evacuating--** to more clearly convey what is being repeated.

Appropriate correction is required.

Claim Objections

Claims 5, 16, and 17 are objected to because of the following informalities:

In regard to claim 5, the phrase, "*repeating the filling and the purging to reduce impurities from the chamber*" (lines 1-2) should be replaced with --repeating the filling and the evacuating to reduce impurities from the chamber-- to appropriately align the steps to be repeated with the steps previously claimed in claims 1 and 3 and the steps disclosed in Figure 2 (the steps of filling and evacuating (206)). Purging is the result of the filling and is not a step.

In regard to claims 16 and 17, the word --valves-- is misspelled "values" (line 1 of both claims).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 13-14, 16-19, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Lessard et al. (US 5,862,671).

In regard to claim 1, Lessard et al. ('671) teach a method of generating a high-level vacuum within a chamber comprising the steps of evacuating the chamber (20) having substantially-pure gas therein (column 2, lines 5-11, the substantially pure gas is

Nitrogen). Freezing residual gas in the chamber to generate a high-level vacuum within the chamber (column 1, lines 23-32).

In regard to claim 2, Lessard et al. ('671) teach that the evacuating comprises evacuating the chamber to a medium level vacuum (column 4, lines 38-42, 58-60). For the applicant's information, a micron in this context refers to a micrometer of Hg (or 0.001 mm of Hg) is equal to $1x10^{-3}$ Torr.

In regard to claim 3, Lessard et al. ('671) teach the step of purging impurities from the chamber (20) with the gas (nitrogen) by filling the chamber with the gas. (column 1, line 64 - column 2, line 4 and column 4, lines 20-23)

In regard to claim 4, Lessard et al. teach ('671) the step of slightly pressurizing the chamber with the gas (column 4, lines 8-13). Note that the comment (column 7, paragraph 1) about ensuring no freezing of any species in the chamber is only germane to the purge process and certainly does not contradict freezing during normal cryopumping operation in which high vacuums are created.

In regard to claim 5, Lessard et al. ('671) teach the steps of repeating the filling of the chamber with the gas and the evacuating of the chamber several times to remove impurities from the chamber (column 4, lines 50-57).

In regard to claim 6, Lessard et al. ('671) teach the step of evacuating the chamber (prior to freezing) to generate a medium level vacuum (column 4, lines 36-42).

In regard to claim 13, Lessard et al. ('671) teach a chamber (20) having a substantially pure gas therein at less than atmospheric pressure (column 4, lines 58-60

and column 5, lines 1-5); a cooling element (70 and 62) to freeze residual gas in the chamber to generate a high-level vacuum within the chamber.

In regard to claim 14, Lessard et al. ('671) teach a medium vacuum pump (88) which reduces the pressure in the chamber to a medium vacuum (column 4, lines 36-42) before operating the cryopump (column 5, lines 1-3) to freeze the gas.

In regard to claim 16, Lessard et al. ('671) teach a system comprising a valve (80) operable to allow gas into the chamber for purging the chamber with the gas (column 4, lines 14-23) and valve (86) operable to allow the medium level vacuum pump to evacuate the chamber to the medium level vacuum (column 4, lines 36-38).

In regard to claim 17, Lessard et al. ('671) teach that the valves (86, 80) are operable to allow the gas into the chamber for repeatedly purging the chamber with the gas, and operable to repeatedly allow the medium-level vacuum pump to evacuated the chamber to the medium level vacuum (column 4, lines 50--57).

In regard to claim 18, Lessard et al. ('671) teach a system controller (electronic module, column 4, lines 24-28) to operate the vavles (86, 80) and the cooling element. The controller's operation of the roughing pump valve (86) is effective for controlling the operation of the vacuum pump (88) relative to the vacuum produced in the chamber (20). Therefore the controller is fully capable of repeatedly purging the chamber with the gas, repeatedly evacuating the chamber to the medium level vacuum, and controlling the cooling to the chamber.

In regard to claim 19, Lessard et al. ('671) teach a gas cylinder (84, and column 2, line 3) having substantially pure gas therein at a higher than atmospheric pressure

(60 psig--column 4, line 21). The gas cylinder (84) to at least slightly pressurize the chamber with the gas prior to vacuum pump (88) evacuating the chamber (column 4, line 38-43) and before freezing.

In regard to claim 25, Lessard et al. ('671) teach that the cooling elements (70 and 62) are coupled to a cryogenic cooler to cool the cooling elements and dissipate heat (column 1, lines 33-40 and column 3, lines 33-43).

Claims 13 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Longsworth et al. (US 5,687,574).

In regard to claim 13, Longsworth et al. ('574) teach a water vapor cryopump (column 4, lines 35-42) comprising a chamber (14) having a substantially pure gas (water vapor) therein at less than atmospheric pressure (column 2, lines 61-64). Although other gases may be present, the chamber (14) contains substantially pure water vapor. The system of Longsworth also comprises a cooling element (44) to freeze residual gas in the chamber to generate a high level vacuum (column 5, lines 33-37). Broadly interpreted, the scope of claim 13 does not require that the chamber contain the pure gas and essentially no other gases, rather it only requires that a substantially pure gas be contained within the chamber. Therefore, the chamber could simultaneously contain substantially pure nitrogen, pure carbon dioxide, etc....

In regard to claim 24 and in conjunction with the broad interpretation of claim 13 immediately above, Longsworth et al. ('574) teach that a gas within the chamber is pure water vapor (column 2, lines 52-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lessard et al. (US 5,862,671) in view of Lorimer (US 5,855,118).

In regard to claim 11, Lessard et al. ('671) do not explicitly teach that a high-level vacuum ranging between $1x10^{-5}$ Torr and $1x10^{-8}$ Torr is generated by cryopumping. But cryopumps are well known for generating this range of vacuum after an initial medium level vacuum of $1x10^{-2}$ Torr - $1x10^{-3}$ Torr as taught by Lorimer ('118) (column 1, line 24). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to combine the disclosed method of Lessard et al. ('671) with the higher vacuum levels of Lorimer et al. ('671) to reach a higher vacuums for providing cleaner environments for fabricating semiconductors (column 1, line 20-26).

In regard to claim 23, see claim 11 above.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lessard et al. (US 5,862,671) in view of Muldowney et al. (US 6,257,001). Lessard et al. ('671) teach a roughing pump which is used to produce a medium vacuum level between 0.075 Torr

and 0.100 Torr (column 4, lines 38-39). Though this pressure range is higher than the range claimed by the applicant (0.01 Torr and 0.05 Torr) many cryopumping systems utilize a roughing pump to obtain an initial vacuum of about $1x10^{-3}$ Torr. This is commonly done because cryopumps operate more efficiently at lower vacuums (less than $1x10^{-2}$ - $1x10^{-3}$ Torr, Muldowney et al. ('001) column 1, lines 25-30). Therefore, though Lessard et al. ('671) do not teach that their roughing pump is capable of reaching the medium level vacuum range of the applicant - 0.01 Torr and 0.05 Torr, it would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to modify Lessard et al. ('671) in view of Muldowney et al ('001) to use a roughing pump capable of reaching a vacuum of 0.01 Torr and 0.05 Torr for the purpose of operating cryopump more efficiently at lower pressures.

Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lessard et al. (US 5,862,671) in view of Sukenobu (US 4,607,493).

In regard to claim 21, Lessard et al. ('671) teach all of the elements of claim 14 as discussed above, but Lessard et al. ('671) do not teach a magnet within the chamber. Sukenobu ('493) teach a superconducting magnet coil (7B) (column 4, line 28) or magnets (14) (column 4, lines 35-40, see also Figure 5) is within the vacuum chamber (1) and in contact with the cooling elements (chevron baffles, 5) for the purpose of preventing β-rays from reaching the cryosorption panel, so that the helium adsorbed on the adsorbent is not adversely desorbed (column 4, lines 15-20, also see column 1, lines 35-68 for a detailed description of how electron impact desorption

reduces the pumping efficiency of cryopumps). Because of the location of the magnet element, the cooling element reduces the temperature within the chamber by cooling the magnet below the freezing point of the gases within the chamber. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the magnets taught by Sukenobu ('493) with the vacuum system of Lessard et al. ('671) for the purpose taught by Sukenobu ('493), that is, to prevent the helium from being desorbed from the cryopanels to maintain a high vacuum.

In regard to claim 22, Sukenobu ('493) teaches that the magnet is further cooled after freezing the gas. The high-level vacuum insulates the magnets (14).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Longsworth et al. (US 5,687,574) as discussed in relation to claim 13 above and further in view of Bailey (US 5,551,244). The system of Longsworth ('574) comprises a chamber (14) and a cooling liquid (column 8, lines 25-33 and refrigerant mixtures 1, 2, and 3) to freeze the substantially pure gas within the chamber. The chamber and cooling system described by Longsworth et al. ('574) is capable of being used to insulate an infared seeker head of a missile. But to further illustrate the capability of the system of Longsworth et al. ('574) for insulating a missile's infared seeker head, consider that Bailey ('244) teaches that such closed cylcle Joule Thomson (JT) systems were commonly known in the art (column 1, lines 24-29) for the purpose of supplying extended periods of refrigeration power. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to employ the JT system

of Longsworth et al. ('574) to cool and insulate the seeker head of a missile, as suggested by Bailey ('244), to provide a longer time period of refrigeration power supply.

Allowable Subject Matter

Claims 7-10, 12, 20, 24, 26-27, and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Remarks

In addition to the support Lorimer (US 5,855,118) provides for the assertion that cryopumps generally reach a high vacuum of the order of 10^{-8} Torr (column 1, line 24), the reference also teaches that purging the vacuum chamber with substantially pure gas (such as Ultra High Purity Argon) (column 1, lines 35-44 and column 2, lines 40-44) is a known means of preparing the vacuum chamber for cryopumping.

The following references made of record but not relied upon, teach the common use of a roughing pump capable of creating an initial vacuum of about 10^{-3} Torr prior to cryopumping:

Hill et al. (US 6,122,920 - column 7, lines 29-32),

Brezoczky et al. (US 6,122,921 - column 1, Lines 38-40),

Krueger et al. (US 6,043,137 - column 1, line 34)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Pettitt whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JFP III
August 25, 2006

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SUPERVISORY PATENT EXAMINER